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EXAMINER

FISCHER, JUSTIN R

ART UNIT	PAPER NUMBER
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1733

DATE MAILED: 12/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/086,685

Applicant(s)

ANDERSON ET AL.

Examiner

Justin R. Fischer

Art Unit

1733

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 26 September 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7, 10-22, 24, 27-49 and 51-60 is/are pending in the application.
- 4a) Of the above claim(s) 34-47 and 57 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7, 10-22, 24, 27-33, 48, 49, 51-56, 58 and 60 is/are rejected.
- 7) ☒ Claim(s) 59 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 26, 2005 has been entered.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-5, 7, 10, 15-20, 48, 51-56, 58, and 60 are rejected under 35 U.S.C. 103(a) as being anticipated by Benson (US 6,096,164, of record) and further in view of (a) either one of Meyer (US 6,082,660, of record) or Knight (US 3,874,030, of record) and (b) Nakagawa (JP 05050515, newly cited).

As best depicted in Figure 1, Benson is directed to a filament winding apparatus comprising (i) a spool section or cabinet 19 comprising at least one fiber bundle spool 18 and a winding head 9 comprising a spreading assembly 35, (ii) a transport or carriage 3 designed to longitudinally move said fiber spool section, and (iii) a controller

Art Unit: 1733

or computerized system for applying said fiber bundle (Column 3, Lines 55-60). The apparatus of Benson includes a plurality of spreader bars (24-26) designed to spread and flatten the fiber bundle. While the bars are not depicted as being curved or bent, it is extremely well known in the winding industry to include at least one curved bar in order to promote spreading, as shown for example by Knight (Abstract) and Meyer (Figure 1 and Column 3, Lines 15-30). Thus, it is evident that the benefits of incorporating a curved bar are consistent with those desired by Benson and as such, one of ordinary skill in the art at the time of the invention would have found it obvious to form at least one of the spreading bars of Benson as a curved bar, there being no conclusive showing of unexpected results to establish a criticality for the claimed arrangement.

It is initially noted that while the apparatus of Benson is described as a filament placement apparatus, said apparatus is clearly capable of carrying out a filament winding technique and thus can be viewed as a filament winding apparatus. In particular, applicant contends that a filament winding apparatus performs without contact between the application section and the mandrel while a filament placement apparatus includes contact between a compaction roller and the mandrel. The examiner respectfully disagrees. The mere presence of a compaction roller does not preclude the apparatus of Benson from functioning as a filament winding apparatus (see Response to Arguments section below).

It is additionally noted that the claim requires "at least two winding eyes...that are oriented such that each fiber bundle exits a winding eye in substantially the same plane

Art Unit: 1733

as each other fiber bundle and at a specified distance from each other fiber bundle”.

The plurality of openings that define comb 23 are seen to constitute the plurality of eyes in that the structure of Benson similarly contains gaps (openings) that function to provide a desired spacing between a plurality of fiber bundles (Column 5, Lines 60-66)- the term “eye” is not seen to require any additional structure. This is further supported by Nakagawa, which describes a filament winding method in which an eye consisting of pins arranged in a “comb like” manner. Thus, the filament winding industry recognizes a comb like structure as constituting an “eye”.

Also in regards to claim 1, the spreader assembly of Benson spreads and flattens the fiber tows or bundles into a wide ribbon- the spreading action results in a decrease in spacing between adjacent fiber bundles and the formation of a substantially continuous band (ribbon) (Column 6, Lines 5-15).

Regarding claim 2, the apparatus of Benson contains a mandrel 10 supported by a headstock 1 and a tailstock 2.

As to claim 3, Benson describes the inclusion of a series of redirects or idler rods to control the tension (Column 5, Lines 40-50).

With respect to claim 4, the arm of Benson supports the spool section and is seen to constitute an articulator.

Regarding claim 5, Benson includes a winding head or delivery head 9.

As to claim 7, Figure 3 depicts a compaction roller 37.

Art Unit: 1733

As to claim 10, Benson states that bar 26 can be kept stationary while moving bar 25. It is additionally noted that the fiber bundle passes between rollers 30 and 31, which would be expected to be rotated.

Regarding claims 15-18, and 31, Benson states that the winding apparatus is a completely computerized system and one of ordinary skill in the art at the time of the invention would have readily appreciated a design in which the computer (controller) controls each of the components of the winding apparatus.

As to claims 19 and 55, the winding apparatus of Benson is suitable for the application of fiber tows on a plurality of designs having a wide variety of shapes, including concave sides, convex sides, truncated sides, and uneven sides. Thus, one of ordinary skill in the art at the time of the invention would have found it obvious to form a plurality of structures using the apparatus of Benson, including fuselages, it being well-known that fuselages are commonly formed with such an apparatus.

Regarding claim 20, the apparatus is clearly capable of applying a fiber gauge tow of less than 0.0038 inches.

Regarding claims 48 and 58, the headstock and tailstock are seen to represent a first providing component that supports or provides a mandrel and the carriage is seen to constitute a second providing component that provides at least one spool configured to travel along a path parallel to the axis of the mandrel. The fiber bundles are directed through a plurality of rollers and spreading bars, which are seen to constitute a feeding and conveying component. Lastly, as noted above, the winding apparatus of Benson includes a head 9, which is seen to constitute a first applying component.

Art Unit: 1733

With respect to claim 51, the apparatus of Benson provides a substantially uniform skin thickness.

As to claims 52-54, Benson states that the winding apparatus is suitable for laying fiber tows on geodesic compound shape forms (Column 2, Lines 65-67). It is noted that the apparatus of Benson is described as having the ability to apply a fiber bundle over an entire mandrel having a geodesic shape form (one can view each half of the mandrel as defining a section). As to claim 54, Benson states that a flat, geodesic, or complex compound shape form is suitable for the inventive apparatus and thus, the apparatus is configured to apply fiber bundles to a mandrel having a geodesic and non-geodesic component.

As to claim 55, the winding apparatus of Benson is suitable for the application of fiber tows on a plurality of designs having a wide variety of shapes, including concave sides, convex sides, truncated sides, and uneven sides. Thus, one of ordinary skill in the art at the time of the invention would have found it obvious to form a plurality of structures using the apparatus of Benson, including fuselages, it being well known that fuselages are commonly formed with such an apparatus.

Regarding claim 56, the apparatus is clearly capable of applying a fiber gauge tow of less than 0.0038 inches.

As to claim 60, straight and curved spreading rollers are known in the filament winding industry and one of ordinary skill in the art at the time of the invention would have been able to appropriately select the type and number of rollers in the spreading assembly of Benson (both straight and curved rollers are detailed in above noted

Art Unit: 1733

references). Absent any conclusive showing of unexpected results, one of ordinary skill in the art at the time of the invention would have found it obvious to include straight and curved spreading rollers.

4. Claims 11-14, 21, 22, 24, 27-33, and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benson, Meyer, Knight, and Nakagawa as applied in Paragraph 3 above and further in view of either one of Nakamura (US 4,921,557, of record) or Poulsen (US 3,886,029, of record).

In describing the fiber bundles (or fiber tows), Benson states that they are formed of pre-impregnated fibers. However, the pre-preg method (pre-impregnated fibers) and the wet fiber lay-up method are extremely well known in the winding industry and are commonly referred to as alternative winding techniques. In the wet lay-up technique, resin is applied to the fiber bundle after it has been delivered from the spool section as opposed to being applied prior to rolling onto the spool. Nakamura and Poulsen evidence the well-known technique in which a resin application system is arranged on the spool carrying carriage, in an analogous manner to the claimed invention. It is further noted that this is consistent with the carriage structure disclosed by Benson, particularly the inclusion of a spool section on a slidable carriage assembly. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to include a resin application system in the apparatus of Benson.

As to claims 12 and 28, the claimed structure represents a common way of applying resin to a fiber bundle in a winding apparatus. Poulsen provides one example



Art Unit: 1733

of such a structure in which resin is transported (from a supply or container) through a hose or piping system to an outlet nozzle or resin dispenser.

Regarding claims 13 and 29, Benson states that tackiness of tows increases with increased temperature (Column 2, Lines 45-55)- thus, by heating the resin, the tackiness of the tow would be increased as desired.

With respect to claims 14 and 30, Poulsen evidences the well-known use of a metering system when applying resin to a winding apparatus (Column 5, Lines 25-35).

As to claims 21, 24, and 49, Benson in view of either one of Nakamura or Poulsen teach the relevant structural components as set forth above.

With respect to claim 22, the delivery head 9 of Benson includes a wrist 17 that is configured to rotate said winding or delivery head.

Regarding claim 27, as noted above, Benson states that bar 26 can be kept stationary while moving bar 25. It is additionally noted that the fiber bundle passes between rollers 30 and 31, which would be expected to be rotated.

As to claim 32, the winding apparatus of Benson is suitable for the application of fiber tows on a plurality of designs having a wide variety of shapes, including concave sides, convex sides, truncated sides, and uneven sides. Thus, one of ordinary skill in the art at the time of the invention would have found it obvious to form a plurality of structures using the apparatus of Benson, including fuselages, it being well known that fuselages are commonly formed with such an apparatus.

Regarding claim 33, the apparatus is clearly capable of applying a fiber gauge tow of less than 0.0038 inches.

***Allowable Subject Matter***

5. Claim 59 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art references of record failed to suggest, disclose, or teach a winding eye structure having ceramic inserts in combination with the claimed filament winding apparatus.

***Response to Arguments***

6. Applicant's arguments filed September 26, 2005 have been fully considered but they are not persuasive.

In regards to Benson, applicant argues that the reference fails to teach the claimed structure and function of at least two winding eyes. As detailed above, the plurality of openings that define the comb 23 are seen to constitute the claimed "at least winding eyes". Applicant further argues that Benson only depicts the inclusion of straight spreading rollers. As set forth above, the inclusion of curved spreading rollers to promote spreading is well known in the filament winding industry- thus, one of ordinary skill in the art at the time of the invention would have had ample motivation to include at least one curved roller in the spreading assembly of Benson. Lastly, the spreading assembly of Benson does spread adjacent fiber tows or bundles, in which case the spacing between adjacent bundles is decreased and a substantially continuous band is formed.

With respect to Meyer and Knight, the references are solely applied to evidence the known use of curved spreading rollers in similar filament winding or fiber application techniques.

Applicant further argues that that the use of oriented winding eyes and curved rods in the device of Benson would cause significant spreading and render the device of Benson unsatisfactory. This argument appears to be based on the specific "eye" structure of the claimed invention- as detailed above, the plurality of openings in the comb 23 of Benson are seen to constitute the "at least two winding eyes". It is emphasized that the openings of comb 23, in an analogous manner to the "eyes" of the claimed invention, define a gap for the fibers to pass through and provide a desired spacing. It is further noted that each fiber bundle exits the comb in substantially the same plane as each other fiber bundle.

Regarding Nakamura and Poulsen, the references are solely applied to evidence the well-known use of a filament apparatus having a resin application system thereon.

### ***Conclusion***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Justin R. Fischer** whose telephone number is **(571) 272-1215**. The examiner can normally be reached on M-F (7:30-4:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on (571) 272-1226. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1733

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Justin Fischer

December 6, 2005